



FORMERLY WILLOW RUN LABORATORIES, THE UNIVERSITY OF MICHIGAN

P. O. BOX 618 • ANN ARBOR • MICHIGAN • 48107

PHONE (313) 483-0500

E 7.5 - 1 0.1 7.9

CA-142307

102100-17-L
25 March 1975

SKYLAB - Water Depth Determination

Quarterly Progress Report
For Period 1 September 1974 to 30 November 1974

"Made available under NASA sponsorship
in the interest of early and wide dis-
semination of Earth Resources Survey
Program information and without liability
for any use made thereof."

EREP Investigation 446
NASA Contract NAS9-13278

(E75-10179) SKYLAB: WATER DEPTH
DETERMINATION Quarterly Progress Report, 1
Sep. - 30 Nov. 1974 (Environmental Research
Inst. of Michigan) 3 p HC \$3.25 CSCL 08H

N75-20782

Unclas
G3/43 00179

Prepared by

F. C. Polcyn, Principal Investigator

D. R. Lyzenga, Co-Investigator

NASA Technical Monitor

Mr. Zack Byrns/TF6
National Aeronautics and Space Administration
Johnson Space Center
Principal Investigator Management Office
Houston, Texas 77058

SKYLAB - Water Depth Determination

Quarterly Progress Report For Period 1 September 1974 to 30 November 1974

This report describes the progress during the seventh quarterly period for EREP investigation 446 entitled Water Depth Determination. The objective is to use S-192 multispectral data along with S-190A and S-190B photography to determine quantitatively water depths that are hazardous to shipping.

The test sites are the western side of Puerto Rico and portions of the Great Lakes, particularly Lake Michigan and Lake Erie.

ACTIVITY

During this period a second set of data tapes was received for the Puerto Rico test site (Pass 6). These tapes contain all SDO's, and SDO 18 (.45-.50 μm) appears to have much less low-frequency noise than the original tape received in January. SDO's 1 and 2 (.50-.55 μm) still have approximately the same amount of low-frequency noise as the original tape. Also, the gain and offset seem to be different on the two tapes, so apparently the published calibration data for the S-192 sensors are incorrect for at least one of the tapes.

Initial experimentation with the new data set focused on an attempt to remove the anomalous dark area northeast of Cabo Rojo, where the single-channel depth technique gives erroneously large depth values. The ratio depth technique failed to remove this anomaly, and we have now concluded that the anomaly is not due to bottom color or water quality variations as was previously thought. Instead, the problem appears to be due to overshoot in the S-192 sensors - i.e., the sensors are unable to adjust quickly enough to the low signal levels occurring in this area after passing over the bright sand on Cabo Rojo. Inspection of the photography and of the scanner data near clouds appears to confirm this hypothesis.

In view of this problem, and because of the remaining low-frequency noise in this portion of the data, future processing will focus on the West Coast of Puerto Rico (near Punto Arenas and Punto Guanajibo, south of Mayaguez). This data was recorded before passing over a large cloud bank which appears to have caused the low-frequency noise in the rest of the data. Although partially obscured by clouds and by a large pollution plume off Mayaguez, this data appears to be of much higher quality than that on the southern coast.



102100-17-L

FORMERLY WILLOW RUN LABORATORIES, THE UNIVERSITY OF MICHIGAN

TRAVEL

None to report.

Respectfully submitted:

Fabian C. Polcyn
Fabian C. Polcyn
Research Engineer

APPROVED BY:

Richard R. Legault
Richard R. Legault
Director, Infrared and Optics
Division

FCP:RRL:njm

102100-18-L
25 March 1975

SKYLAB - Water Depth Determination
Quarterly Progress Report
For Period 1 December 1974 to 28 February 1975

EREP Investigation 446
NASA Contract NAS9-13278

Prepared by

F. C. Polcyn, Principal Investigator

D. R. Lyzenga, Co-Investigator

NASA Technical Monitor

Mr. Zack Bryns/TF6
National Aeronautics and Space Administration
Johnson Space Center
Principal Investigator Management Office
Houston, Texas 77058

SKYLAB - Water Depth Determination

Quarterly Progress Report For Period 1 December 1974 to 28 February 1975

This report describes the progress during the eighth quarterly period for EREP investigation 446 entitled Water Depth Determination. The objective is to use S-192 multispectral data along with S-190A and S-190B photography to determine quantitatively water depths that are hazardous to shipping.

The test sites are the western side of Puerto Rico and portions of the Great Lakes, particularly Lake Michigan and Lake Erie.

ACTIVITY

During this period an attempt was made to gauge the accuracy of the single-channel depth technique by means of a comparison of the calculated values with depth values read from coast to Geodetic Survey Chart 901. For this purpose four lines were drawn in the Escollo Negro area on the West Coast of Puerto Rico. Depth values were calculated at 81 points along each of these lines, and values were independently read from the chart at each point. The main features in the two sets of values seemed to correlate quite well with each other, although there was not quantitative agreement in all cases. The r.m.s. deviation between the two sets of values was approximately 4 meters, out of a maximum depth of about 24 meters. Much of this deviation is due to errors in reading the chart or mis-registration between the chart and calculated values. Some error is also expected in the calculated values due to the presence of clouds, which affect the surface-reflection signal, and to limitations of the single-channel technique (i.e., changes in bottom reflectivity and/or water turbidity). The multi-channel ratio technique could not be applied because of excessive noise in band 5 (.60-.65 μm).

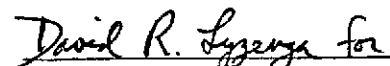
Data tapes for the Lake Michigan test site have also been received and converted to ERIM format. The amount of water depth information on these tapes is limited, because of the steep bottom gradient and the relatively high water attenuation in Lake Michigan. Some sandbars are visible on the S-190B photography in the area south of Pentwater, Michigan. Evidence of these can also be found in the

S-192 scanner data, although they are just marginally within the resolution capability of the scanner. In the next quarter, we plan to do some densitometry of the high resolution S-190B photography as well as further analysis of the S-192 scanner data.

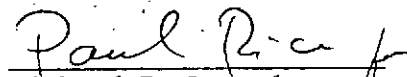
TRAVEL

None to report.

Respectfully submitted,


Fabian C. Polcyn
Research Engineer

APPROVED BY:


Richard R. Legault
Director, Infrared and Optics
Division

FCP:RRL:njm